CPG LPR FS Proposal for Subsurface Remedial Action Level

to Achieve Remedial Action Objective 2, Jan. 18, 2019

AND

CPG Slides on Remedial Footprint Development, Feb. 4, 2019

NJDEP observations, questions and comments for further discussion among IR work group participants

CPG LPR FS Proposal for Subsurface Remedial Action Level to Achieve Remedial Action Objective 2, Jan. 18, 2019

1. Page 1, first paragraph: subsurface sediment targeted that has a "demonstrated potential" for erosion to expose subsurface concentrations above defined subsurface RALS.

Definition for demonstrated potential for erosion needed. It should refer to areas which have been identified as erosional through any two sets of bathymetric surveys. It should not be limited to only those areas which have demonstrated repeat erosion.

2. Page 1, third paragraph: Erosional areas should include areas shown to be erosional through RI App M, Attachment B, in which up to approximately 71 acres upstream of RM 8.3 eroded between the 2008 and 2010 surveys (email from J. Wolfe, LimnoTech to A. Hayton, NJDEP 12/18/2018).

3. In addition, RAO 2 application must account for missing information:
    - lacking information on up to 1/3 of the area between RM 8.3 to RM 15 (~ 35%) due to inability of current surveys to "see" much of the shoal areas, and
    - lacking information for areas which erode less than 6 inches

4. Page 2, top paragraph: Regarding areas of cyclical erosion, text states that mobile sediments exist on a bed that has been "armored" by past high-flow events, implying these areas are less conducive to future erosion. The phenomenon of "armoring" requires further description and verification using site-specific information (was this described in the RI-? If so, please reference). To date, existing sediment bed "armoring" has not been discussed relative to this IR.

5. Page 2, first full paragraph: Text introduces the concept of subsurface sediment's low likelihood of exposure. The line of evidence described is the sustained presence of elevated subsurface sediment concentrations despite having been subjected to repeat erosion. However, this logic seems to assume a system with a shallow depth (limit) of contamination, whereby subsurface contamination is progressively depleted and replaced with cleaner sediment over time.
Response: These conditions do not exist in most areas of the LPR because: a. contaminant concentrations generally *increase* with vertical depth, (i.e., presenting a significant reservoir of highly contaminated sediment) and, b. infilling occurs with highly contaminated sediment eroded from elsewhere in the system.

6. The RAO 2 PCB RAL has previously been proposed as higher than (~2x's) the RAO 1 PCB RAL in recognition of outside PCB influences on the system, versus the TCDD RAO 2 RAL having been proposed at 1x RAO 1 TCDD RAL, due to lack of outside TCDD influences on this system (USEPA-R2 RAO letter to CPG, Dec. 14, 2018). NJDEP agreed with this logic and continues to believe this is an appropriate way to handle RAO 2 for PCBs.

7. Page 2, third paragraph: Again, the term and phenomenon of "armoring" is used, without also presenting site-specific evidence for same.

8. Page 2, last paragraph: Text indicates that between RM 8.3 and RM 15, 26.4 acres were identified has having experienced 6 inches or greater of erosion using comparison of bathymetric surveys in 2008 and 2010. Text further states that of the 26.4 acres, only 6.3 acres experienced repeat erosion between 2010 and 2012.

a. First, this areal extent of erodible sediment (26.4 ac) differs from RI App M, Att B (see comment 2 above). Reconciliation of this information is needed.
b. Second, although useful, repeat analysis does not account for *other areas* which erode under conditions that differ than those experienced between the 2008 and 2010 surveys, i.e., erosional under alternate storm conditions.
c. The 0.25 repeat erosion factor (probability of erosion) presented on page 3 is not fully accepted as an inclusive (protective) approach for estimating the power of subsurface sediment exposure and/or release at levels greater than the RAO 1 RAL because only a portion of potentially erodible areas are identified as erosional.

9. Text suggests that given the aforementioned analysis, a value of 0.5 (2x RAO RAL) is conservative. For the following reasons, NJDEP does not agree:
    - The analysis appears to underestimate erodible areas, i.e., identifies only 26.4 acres as erosional between RM 8.3 – RM 15, whereas, RI information indicates at least twice this amount as having experienced greater than 6 inches of erosion.

    - The analysis is solely based on an evaluation of repeat erosion using limited bathymetric surveys and does not account for variations in erodible areas depending on differing storm conditions (mix of tides and timing and intensity of storms and other contributing factors).

    - Areas which erode once may have a greater than 50% chance of eroding again in the future.

    - The analysis does not take into account the 1/3 of the area between RM 8.3 and RM 15 that is not mapped due to current bathymetric survey limitations.

CPG Slides (total of 39) on Remedial Footprint Development, Feb. 4, 2019

Slide 3: Clarification – Is there a way to adjust model projection's footprints using existing multibeam data, given that model-only projections inherently under-predict erosional areas and likewise understate post remedial SWACs?

Slide 4: Footprint Development Steps

Item 2 (RAO 1 process)

Current proposal – Hill top for PCBs first, to remediate all areas greater than the 1 ppm RAL, to attain the target PCB SWAC of 0.45 ppm. Following this, hill top for TCDD to the point of achieving the target SWAC of no greater than 85 ppt, revealing the RAL to achieve this SWAC. Please describe the implications of this sequence. What are the specific technical advantages and disadvantages of this sequence? Are all later tables in these slides developed in this manner?

Item 3 (RAO 2 process) NOTE: Subsurface concentrations are simulated only and have greater current uncertainty than surface sediment concentrations. Subsurface concentrations were generated in Appendix J to be representative in terms of their relationship to surface concentrations.

Slide 5: Clarification – Describe what is meant by respecting "mapping group boundaries" (examples?)

Slide 6: Describe process for selecting DU Center point concentration from CS37 map. Is the selection process random or non-random, and is there a review incorporated to ensure that polygon concentrations are representative of the CS37 map?

Slide 7: For FS, some degree of interpolation or manual delineation should be considered using RI data to account for known physical features such as Shoal-channel boundaries and sediment types boundaries. Using unadjusted Thiessen polygons, that do not use information available in the RI, are not preferred (i.e., resigning to excessively "rough" estimate when improvement can be made).

Slide 8:

a. Second bullet states that the SWAC is calculated from the full conditional simulation map and the DU centerpoint concentrations are only used for targeting. Implications?

b. Under assumptions, remediated areas have a zero concentration -- As indicated in the most recent work group meeting, this assumption is not a preferred approach for this project given experiences observed for other dredging projects.

Slide 10: What are the residual concentrations in un-remediated areas? How addressed?

Slide 11: Basis for use of 200 ppt TCDD for the TCRA RM 10.9 area is needed (should be somewhat higher using most recent data?)

Slides 12 and 13: Using a positive SWAC number for the covered surface is an improvement. If this is part of an adaptive management remedy, there should be a basis for the assumption (i.e., cite source and/or a description of method(s) that will achieve that result), a way to monitor to confirm this assumption, and a plan to adapt if not achieved.

It's also implicitly assumed that remediation doesn't affect non-dredged areas. What's the plan to accomplish that, how would it be monitored, and how would the Adaptive Management Plan adapt?

Slide 14: Clarification needed - What's the current plan for determining erodible areas for the Remedial Design? Using expanded bathymetry, improved modeling, a combination, or not decided yet?

Slide 15:

a. First bullet, clarification needed - The RD will consider areas of 15 cm erosion. Is this 15 cm of erosion over any time interval or net erosion over a long interval (less conservative)? Will this be determined using methods consistent with Appendix M Bathymetry Attachment B to the RI, or different methods supporting RI Section 7 and/or recent CPG PowerPoints?
b. Second bullet, for the 35% of area not addressed by bathymetric information, the ST model will be used, but this tool is known to under-estimate erosional characteristics. How will this be managed during FS?

Slide 18: Why can't bathymetry data be use in some manner to improve calculation of erosional areas by the model? Otherwise, such areas will be underestimated in projections generated by current modeling tool. How is the approach presented on this slide considered informative at the FS stage? Please explain (i.e., like to like for tool, and strictly for modeling purposes?).

Slide 19: Why is RAO 2 limited to "long-term erosion"? (areas of net erosion?) Please clarify and also explain basis of using a long-term erosion threshold of 0.42 cm/yr (cite source).

Slide 20: The modeled long-term net erosion threshold is set low to fit underprediction of erosion by the model; it's a way for the model to define some erodible areas. It's not a real target compared to real data, but a way of managing the model.

There may be a desire to have the FS areas to be based on the model so that some benefit to the RAO2 footprint is shown, but it's unclear this can be shown because the model won't erode down to the second layer. (This slide shows 1 cm/yr erosion to be very rare, and it would take 15 years of erosion at 1 cm/yr to erode by 15 yrs * 1 cm/yr * 1"/2.54 cm = 5.9".)

There may be areas where the model erodes deeply and then deposits so that net erosion is negligible. The deepest erosion into the initial sediment bed at each location might be a more appropriate metric. Has that been considered?

Slide 22: This model-based result looks very similar to the desktop result (slide 17). Is that the objective, choosing values for the model scenario (like the 0.42 cm/yr) to accomplish that?

Slide 23: Given the uncertainties in identifying erosional areas and the concentrations of subsurface zones, it is considered technically unsound to reverse order of operations by performing RAO 2 followed by RAO 1. Subsurface concentrations are simulated only and have greater current uncertainty than surface sediment concentrations. Subsurface concentrations were generated in Appendix J to be representative in terms of their relationship to surface concentrations.

Slide 24: For reasons described in bullets 3 & 4 on this slide, the order of operations for footprint development in the FS and then again in RD, should remain as RAO 1 followed by RAO 2.

Slides 25 and 26: Probabilities of erosion appear too small relative to RI Bathymetric studies.

Slide 27: Given the relationships depicted on this slide, and the fact that RAO 2 as 1x RAO 1 RAL for TCDD is more protective, but only results in increasing remedial acres by **2** –> *Use 1x RAO 1 for FS is preferred approach*. Perform further analysis in RD to determine if using a value greater than 1 (1.2, 1.5…) but no greater than 2, can be justified.

Slides 33 to 35: These outcomes look attractive, the approach being conservative enough to achieve the target SWACs over a range of sediment map uncertainty. For slide 35, as noted previously (slides 12 & 13 above), the method of minimizing recontamination, monitoring, and adaptation to different outcomes, needs to be developed and described in the FS.

Slide 39: For several reasons (challenges) further discussion needed to better identify how to address RM 10.9 in footprint development the IR.

Supplemental observations/questions:

1. For TCRA RM 10.9 – there remains an approximate 50- ft. wide area that is un-remediated and has TCDD concentrations of > 1,000 ppt TCDD, and other co-located contaminants. This remains an issue to address.
2. When and through what methods will smaller SWACs be considered based on the proposed approach for remedial footprint development? (CSTAG 4 b)
3. When and through what methods will areas conducive to “dredging to clean” be considered?